

EDITORIAL ARTICLES.

SOME RECENT SCANDINAVIAN CONTRIBUTIONS ON TUBERCULOSIS OF THE KNEE-JOINT AND ITS SURGICAL TREATMENT.

1. *Emil Müller.* Om Arthrektomia Genus ved Tuberkulos Artroitis. (On Arthrectomia Genus in Tuberculous Arthritis.) Inaugural Dissertation. Copenhagen. 1889. 281 pp.
2. *Hagb. Ström.* Knæledstuberkulosens og dens Kirurgiske Behandling. (Tuberculosis of the Knee-Joint and its Surgical Treatment.) Christiana. 1889. 167 pp.
3. *Prof. Plum.* Bør Arthrektomi eller Resektion foretrækkes ved den tuberkulose Gonitis hos Børn? (Is Arthrectomy or Resection to be Preferred in the Tuberculous Gonitis of Children?) A Lecture before the Copenhagen Medical Society. Hospitals—Tidende. Jan. 8, 1889.
4. *Gabriel Tryde.* Om Iodoformgaze-Tamponade og Sekundær Suture ved Resectio (eller Arthrectomia) Genus for Arthroitis Tuberculosa. (On Iodoform-gauze Tamponade and Secondary Suture in Resection (or Arthrectomy) of the Knee for Tuberculous Arthritis.) Hospitals—Tidende. Dec. 3 and 11, 1889.

The simultaneous appearance in Scandinavia of several contributions upon tuberculosis of the knee-joint is indicative of the interest which this subject is exciting in the northern European countries.

1. Dr. Müller has somewhat limited his work as he nearly exclusively treats of arthrectomy, considering, however, its relation to resection of the knee-joint. He first goes through the history of arthrectomy and presents a distinct picture of the course of its development. Then the various opinions expressed in the literature on the functional results, the question of a moveable joint and the different opinions for and against the operation are presented. He holds to König's¹ views

¹König. Die Tuberkulose der Knochen und Gelenke.

on the pathological anatomy of the joint disease. The clinical picture is given a very short consideration. After a schematic synopsis of the 42 cases of arthrectomy of the knee-joint taken from the large Danish hospitals for the last four years, he describes the technique of the operation, partly from the literature and partly from his own material. The various methods of opening the joint are presented and criticised, as well as the after treatment, after which he treats of that which is the real subject of his investigations, the results of arthrectomy with regard to the dangerousness of the operation to life, to radical cure of the affection and the functional results obtained. As to the dangerousness of the operation he first mentions the danger, pointed out by König, in operating on tuberculous joints, of an outbreak of universal miliary tuberculosis from direct inoculation during the operation. This danger, he thinks should be considered along with the question whether in a given case one should operate or treat conservatively. In one of his cases death was probably due to such an inoculation tuberculosis, but the case was not clear as the healing process of the wound was complicated by gangrene of the skin flap and deep suppuration. On the other hand he thinks one is somewhat justified in taking the views in case of an operation that possibly by removal of the tuberculous focus one may ward off the danger of a later general tuberculous infection. He closes by saying that arthrectomy of the knee presents no dangers for the life of the patient, neither in the operation itself nor in the after-treatment, for out of 42 cases of his, 2 only ended fatally and death in neither of these cases can, directly or indirectly, be said to be due to the operation. For this reason he places arthrectomy above all the other procedures and would give it considerable preference over the conservative treatment. The length of time of treatment is of essential importance; he especially emphasizes that in his cases it was, on an average, 7.3 weeks, but that when uncomplicated the period was much shorter, so that many patients would leave the bed after 6, 4 and even 3 weeks.

With regard to the other questions, how far arthrectomy is able to cure the local affection, the writer makes a comparison with resection which, however, is an unfortunate attempt as he does not have at his

disposal a corresponding number of cases of resections treated according to the same method as his arthrectomies. He cannot use for this purpose the 45 cases of resection collected by Ipsen as many of them were not treated according to the principles generally accepted in arthrectomy and resection. On page 113 he says; "The two operations offer about equally good chances for a cure of the joint disease." It seems that he comes to this final conclusion from a comparison of his arthrectomies, which gave 66.7% of cures, with newer statistics on resection from other countries having a percentage of 71 to 77%. But here the writer regards his own cases with a little too much favor for he has reckoned among the 66 7% of cures after arthrectomy, not only those which were cured after more or less grave operations but also partly cases where, on account of the short period of observation, and the lack of later information, he was obliged to class them as "cases with an uncertain result." In some of these the period of observation after the operation was so short that he cannot draw any definite conclusions now. His expression that the two operations seem to have, with regard to cure, about the same results, directly conflicts with that which he gives as the result of arthrectomy. For, when among 41 cases he only finds 15 without any recurrence, in contrast to 26 with a recurrence, and where the greatest part of these were of such a nature that in 10 cases a secondary resection was necessary, it is scarcely the best proof of the correctness of the a priori assumption that resection stands somewhat above arthrectomy with regard to the radical removal of all the diseased tissue. Also the possibility that in arthrectomy osseous foci which have not reached the surface might be overlooked finds a confirmation in the writer's cases for he admits that in 8 of his cases this was true.

The writer divides his cases into 4 groups in considering the question: In how many cases one may assume to have approached a radical extirpation of the diseased tissues by arthrectomy, oblique or longitudinal incision with or without severing of the ligaments. Such a division seems hardly justified as his cases are extremely limited in number and it would not lead to any definite results, whether the ligaments were severed or not when no regard was paid to the extent in

which the disease presented itself at the operation. In general one may assume that the surgeon in a given case will remove and in another preserve them, his method being dictated by the extent of the disease. Indeed arthrectomy is nearly an atypical operation where one decides by the greater or less extension of the diseased process with regard to the extent of the operation.

In the third chapter he gives, under the functional results after arthrectomy, a clear review of the various factors which play a role after resection. Then he states the results of 18 arthrectomies performed upon 18 children, who varied in age from 2 to 16 years. In the greater part of these shortening was not to be noticed, or, if present, it was so little as to have no essential influence upon the function; and, what is more important, in 5 cases he noticed a distinct prolongation of the extremity operated upon; in 2 cases it reached 3 cm. The most interesting are his results as to the adhesions between the ends of the bones after arthrectomy. Among 25 cases, with regard to which the writer was able to get information on this point, he found, 17 times, flexion—as, a rule, not to a great extent—while only 8 patients presented a completely extended knee. Of these 8 there were 6, perhaps 7, which had obtained an active mobility, while this was only the case in 1 of the 17 with a flexion contracture. This, he thinks, points to the muscles being the chief factors in the origin of the contractures. After having described the relations which most probably have an influence upon the later functional result, he ends his treatise by saying that the conclusion seems justified that one must be insane to want to induce ankylosis after arthrectomy. It is very probable that in many cases where there is incomplete ankylosis, by the employment of baths, massage, electricity and passive movements, quite an active mobility might be obtained, and this, he thinks, will be the treatment of the future.

2. Dr. Strom has given his work a much broader scope, as he presents a clear and concise picture of tuberculosis genus and its treatment, based upon about 200 cases of tuberculous gonitis treated in the "Rigshospital" in Christiania from 1873 to 1887. His presentation of the disease is grounded upon the works of Köster, Hüter, König and

several others. This material is carefully examined with reference to the age and sex of the patient, and the various ætiological factors. He presents the pathological anatomy according to König and Volkmann. He divides his cases into 4 principal forms: 1. The fungous form (the former tumor albus); 2, the form described by Volkmann as caries sicca; 3, the tuberculous hydrops and cold abscess of the joint. He mentions the varying frequency, course and prognosis of these forms, basing himself upon his cases, and emphasizing especially the clinical and prognostic importance of beginning suppuration. He, by means of a series of detailed statistic calculations, demonstrates how the clinical form under which the disease appears will always be one of the decisive factors when, in a given case, one is to give the prognosis and decide as to treatment.

In the second chapter, the surgical treatment of knee-joint tuberculosis, he considers the question of the primary and secondary origin of the disease, and the practical consequence with regard to the indications for operative procedure. Here he is inclined to place himself in opposition to König's views, as his material seems to justify the opinion that we are best able to reduce the mortality of universal tuberculosis by operative procedures, which completely eliminate the local focus in the joint. The danger of inoculation of miliary tuberculosis, by the operation, pointed out by König, he thinks, in a great degree exaggerated by the latter and Wartmann. He then investigates especially the results of the various methods of treatment and their indications. An exclusively non-operative treatment was employed in 63 cases; of these the results were known in 56 cases, which gave a percentage of 66 (37 cases) entirely cured. But the writer emphasizes correctly that this percentage is misleading; if one will have a correct expression of the results of expectant treatment, then one must also include all the cases where it failed, and where an operation was necessary later on account of this. By this method he finds that 27.5% of the number of cases treated has been cured by exclusively operative treatment. This method was very much employed in children, and has given the best results in those groups where the age varied between 5 to 10 and 10 to 15 years. It was especially employed

in those cases which appeared under the picture of caries sicca; a particularly unfavorable result was obtained in tuberculous hydrops. The functional results hereafter cannot be called good, for out of 37 cases only 2 had good motion of the joint, 2 some motion and moderate contracture, and the rest ankylosis, with more or less flexed knee.

A series of minor operative procedures, as puncture of the joint with antiseptic erosion, arthrotomy with erosion and partial extirpation of the capsule have not given encouraging results. The outcome was especially bad after puncture of the joint in tuberculous hydrops. But here he remarks that these partial operative procedures were especially performed in elderly individuals, entirely contrary to the views of most modern surgeons, *i. e.*, that partial operative procedures are indicated in childhood, as one may reckon upon the natural tendency to heal, while diseased processes in adults are inclined to maintain their destructive character. But he also thinks that these partial operative procedures are in many cases unnecessary, and merely complicate the condition. Even where a recovery has taken place afterward he assumes more probable that the operative procedure had no essential influence upon the course of the disease. Here he is directly opposed to Ollier who has obtained excellent results with partial operations in young patients. Also with regard to the functional results his few cases do not speak in favor of this treatment; ankylosis has been the regular outcome. Ignipuncture is given a mere mention on account of the good results which French surgeons have obtained with it, and their unanimously favorable views on this measure; he has had no personal experience with it, and it seems to be as little used in Norway as in Denmark. Arthrectomy and resection are given as the real operative procedures to be used in knee-joint tuberculosis, as they give full access to the joint, and permit the total extirpation of all the diseased tissue, which, indeed, is the chief object of the operative therapy. The advantages and disadvantages of the two operations are considered. In all the writer has 12 arthrectomies and 66 resections at his disposal. Although after resection the results seem to have been better than after arthrectomy, especially if one uses the resections which were performed after 1882, during which time antiseptics was carried out, as

well as was the careful removal of all the diseased tissues done as a rule, yet his material does not allow of a definite conclusion on the value of arthrectomy or resection, partly, because of the small number of arthrectomies, and partly, because of their being done by a less complete method—by double lateral incision. On the whole, he is more in favor of resection which, in his cases, has given 67.5% definite cures, confirmed after many years. In any case, resection should be performed in adults; in children, the question he regards as still open.

Finally, amputation of the thigh is considered, together with its indications in tuberculous gonitis. In general, amputation of the thigh may be said to be indicated when by no conservative method can a serviceable extremity be made for the patient and where there is a prospect of securing the patient from the secondary consequence of the disease, or where there are already signs of this to prevent its development. More especially does he consider the question of amputation in relation to the age of the patient. He would find an absolute indication for primary amputation in cases which originate or come under treatment at the age of 50 to 55 years for then one cannot expect to obtain a sufficiently solid consolidation. At this age the disease develops so rapidly and leads so quickly to suppuration that great destruction of the joint must naturally ensue.

Amputation may be contra-indicated in the individual under 20 years; one such case is mentioned where the general condition of the patient, which was complicated with tuberculosis of various organs, necessitated the sacrifice of the limb in order to save his life. The relations are, however, different in patients between the 20th and 50th years, for here a persistent suppuration more rapidly has an influence upon the general conditions and internal complications manifest themselves more early.

If the suppuration cannot be removed by resection, or the pus has burrowed to such an extent that an extensive tuberculosis of the soft tissues has resulted, then amputation is inevitable. The same holds good with extensive complications of the internal organs as resection

presupposes a process of reparation which places greater demands on the patient's vitality than one can reckon upon.

3. The speaker gives the history of the origin, course of development, and the present standing of arthrectomy, defining the essential points of the operation and reviewing the results of individual operators. The nomenclature of the pupil of Volkmann, Heidenheim, is referred to. The results of a Danish surgeon, Iversen, who appeared as a warm defender of arthrectomy after 5 observations, are mentioned. These were mentioned in a lecture before the Copenhagen Medical Society (*Hospitals Tidende*, Nos. 16 and 17, 1885). He then calls attention to a result which he has noticed in two of his cases, namely; a lengthening of the extremity after operation. He thinks that when conservative treatment does not prevent the further encroachment of tuberculous gonitis, the operation should, as a rule, be performed that: 1, as far as possible all diseased tissue be removed thoroughly and lastingly, and, 2, a good ankylosis in a desirable position be made so that the limb may be a desirable support to the body.

In the removal of the diseased soft parts he obtained the best results from his arthrectomies as the cases healed by first intention without any fistulæ, in the course of a few weeks. If the capsular disease is extensive, especially back towards the popliteal space, then a complete opening of the joint with severing of the lateral ligaments, and in some cases partial removal of the crucial ligaments, were necessary. As to the removal of all the diseased tissue the two operations were equal in value, if in arthrectomy we cut through the lateral ligaments and render the posterior portion of the capsule accessible. As to the production of ankylosis in a desirable position, he regards this as a weak side in the operation of arthrectomy. For the patient, after leaving the hospital with the limb in a stiff bandage, notices a bending with an abrasion of the skin on the front of the knee, and for this reason children after this operation have to be bandaged and kept continually under surveillance.

In two of his cases operated upon in 1886 he observed a peculiarity which has made him have less confidence in arthrectomy, namely, the

prolongation of the extremity operated on mentioned before. The long and stiff extremity is a continual annoyance to the patient. A simple elevation of the pelvis on the affected side does not smooth out the matter, but causes the bending and valgus position of the piece, seen in such patients, to become worse. This prolongation is due to the congestion and increased development of the blood-vessels in the epiphysis as a consequence of removing the capsule so near the epiphysis.

Prof. Petersen, of Kiel, is cited as having communicated a similar case, but in his case the lengthening lessened and in the course of a few years the limbs were entirely equal, and indeed some shortening followed. Hence the writer has abandoned arthrectomy in children for resection; he never has tried the operation in adults. When he does not advise arthrectomy he means only total arthrectomy, which requires a complete opening of the joint. Partial extirpation of the capsule might be tried in some cases, in the beginning of the disease. Shortening does not occur to any great extent after resection; he thinks the dangers of this are much exaggerated, for he has seen an osseous union take place even in quite young children. When shortening does take place he considers it due to an improper adaptation or union of the surfaces, so that an osseous union does not form by first intention or to an improper treatment of the wound. After inter-epiphyseal resection the resected extremity keeps good pace, as a rule, with the development of the other. For the last ten years he has several times resected by this method, and has seen the resected limb grow and leave nothing desired in its functions. A slight evidence of shortening is present, as a rule, but this is a necessity for the free and easy use of the rigid limb, and if quite noticeable it may be removed by a thick sole.

If in resection it is necessary to go above both epiphyses, then quite a shortening is to be expected, but the limb cannot be purchased at a less cost and such an extremity is to be preferred to a thigh amputation stump. But such a resection is very seldom required. In general a couple of discs sawed off, without, however, nearing the epiphyseal line, are sufficient; then from here one may dig and chisel out

the diseased tissue, thus getting the same results as in arthrectomy. If one condyle be more diseased than the other, then it may be cut off obliquely and the other sawed off in the opposite direction to correspond.

Finally he advises in the tuberculous gonitis of children the employment of resection in preference to arthrectomy and its performance as follows: After careful cleansing and the application of Esmarch's bandage to the thigh: 1, a transverse incision over or through the patella and complete opening of the joint; 2, horizontal epiphyseal sawing of the condyles, removal of all the diseased tissue possible with the chisel; 3, total extirpation of the capsule and all the soft tissues diseased; 4, ligation with catgut of all the larger and smaller vessels; 5, careful co-aptation of the osseous surfaces, they to be held in position by means of two long nickled steel wires, introduced from one condyle and passed obliquely down and over to the opposite tibial tuberosity; the other in the other direction from the opposite condyle; 6, a short drainage tube into each corner of the wound; the outer wound being united by means of the continuous catgut suture; 7, the wound then is to be covered with glass-wool, upon which a sublimate-wool pad is to be applied with compression; 8, Esmarch's bandage is then loosened; 9, the thigh and dressing are then wrapped in cotton and two concave lateral splints of pasteboard are applied and then a posterior Gooch's splint and an anterior suspension splint, which is also applied with a stiff bandage. The limb is kept elevated from 12 to 24 hours, and then is lowered according to the desire of the patient. After a month the bandage is changed, the sutures and drainage-tubes removed, and a new stiff bandage applied, after which the patient may get up and about on crutches. The stiff bandage is kept on the first half-year, after which it may be changed once or twice.

4. The writer, from a series of observations made in the "Kongelige Fredericks Hospital," with regard to the question whether iodoform-gauze tamponade has any influence upon the course of arthrititis tuberculosa after operation, concluded that it only influenced recurrence and the frequency and intensity of secondary infection in so far

as it induces healing by first intention in many cases, and especially in those where the wound is extensive.

The number of days that the patients were under treatment was also very much reduced, especially in those where the wound healed by suppuration. Finally he concludes that this method gives better results than the treatment generally used.

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